

Winter Management of Dairy Compost Bedded Pack Barns

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Maintaining active composting in a compost bedded pack barn is a real challenge during the winter months. Bed management, weather, stocking rates, barn design, and ventilation rate all can have an impact on bed composting and they can easily become too cool, mucky and wet. To keep cattle comfortable and dry in these situations, sawdust bedding is used in higher amounts which increases costs. You may also have difficulty locating or purchasing enough bedding to keep the bed dry. Further, attempts to use alternative bedding materials can lead to very poor bed conditions and have a negative impact on somatic cell count and milk production.

The theme of “Keeping the Heat” becomes more important for successful bed operation during the winter months. Even in very cold climates, compost bedded packs can function reasonably well. We want to manage the beds to generate and retain sufficient heat to overcome heat losses to the atmosphere. To generate sufficient heat, the compost bed must be stirred (to a depth of 8 to 12 inches) to increase oxygen in the bed which leads to active composting. The compost bedded pack has a large surface area in relation to the volume of bedding that is generating heat. The goal is to stir the pack 12 inches deep to increase the amount of material composting and the amount of heat generated by the pack. Chisel tillage and roto-tillage tools do not always achieve the desired depth. Sweep tillage tools have more success in reaching the desired depth of 12 inches but produce large chunks when high moisture, compacted beds are tilled. The best tillage approach could be a combination of deep tillage once or twice per week with a roto-tiller used the remainder of the week. The roto-tiller will break up the chunks. In field observations, the combination of deep tillage with a roto-tiller seems like the best way to maintain enough active compost within the pack for maximum compost bedded pack performance.

It becomes difficult to start or restart a compost bedded pack barn in winter with low bacterial activity since heat losses can easily exceed heat generated. Compost bacteria do not grow when temperatures are below 40°F. Therefore, going into winter, the bed must be performing well. It is important to have dial or digital thermometer with a stem of 8 to 12 inches to monitor bed temperatures. Temperatures between 4 to 8 inches deep should be in the range of 110-130°F and a moisture content of 40-50 %. During the winter, the temperature would be the first indicator of changes in bed performance. If the temperatures in the bed are trending down, then become more aware of the moisture and cattle cleanliness. If moisture becomes too high, the temperature drop could become dramatic and could be difficult to recover, particularly, if cold, windy weather is occurring in a barn with open sidewalls and no curtains.

What if elevated temperatures in the bed are not achieved in the winter? In the short term, manage as a bedded pack barn with the continual addition of bedding material if severe or long cold spells occur. Use cow cleanliness as an indicator of when to add new bedding. In the meantime, you may want to try to increase composting activity in the bed. If the bed is above 50°F in the 12 inch surface layer, try to stir and determine over the next few hours if the temperature rises as a result of the extra air (oxygen) provided for the compost bacteria.

More success can occur if there is a calm, sunny day where heat loss from the bed as a result of cold breezes is minimized. If there is a temperature rise, stir again at the next milking. Do not over stir, since tillage increases evaporative cooling of the bed. Cautious management of the stirring and with observation of bed temperatures may get the compost bedded back to active heat production.

If the composted material needs to be removed from the barn, you may consider building a new bed base of at least 12" by returning material from the top layer. This is the most active bacterial layer for composting. This is the most important in the fall so that an active compost bed is established before the winter as noted above. If the bedding material needs to be removed in the fall (because the bed is too deep or the timing is right for field application), removal is preferred to occur before the end of October. This again allows time to get the bed actively working before winter. November or December cleanouts are risky if cold weather comes early.

In the winter, side curtains can be an important investment to reduce barn ventilation and winter winds from extracting too much heat from a compost bed. Also, outside edges of the barn's bed can lose significant heat during the night through radiation to clear skies. One option that has been considered by dairy producers is to reduce the bed stirring to once per day since stirring increases water evaporation and increases bed cooling. However, not stirring would reduce moisture loss and lower evaporative bed cooling. This results in less heat formation and higher bed moisture, leading to dirtier cows because manure is not stirred into the bed, more bedding use and potentially decreasing milk quality with higher somatic cell counts. This option is **risky** as a general rule. If you do not have side curtains, consider some type of temporary curtains as a first option before reducing stirring frequency. Always remember that stirring the bed increases the oxygen in the bed which composting bacteria need to generate heat. We continue to improve our understanding of compost bedded pack barn management from working with dairy producers who have approached us with management suggestions or concerns. If you experience any trouble with your barn this winter, please contact Jeffrey Bewley at 859-257-7543 or jbewley@uky.edu.